

## Tubular Extendible Lock-Out Composite Boom (STELOC, Phase I)

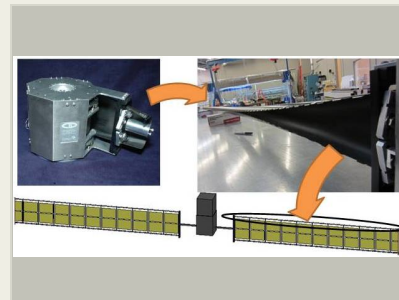
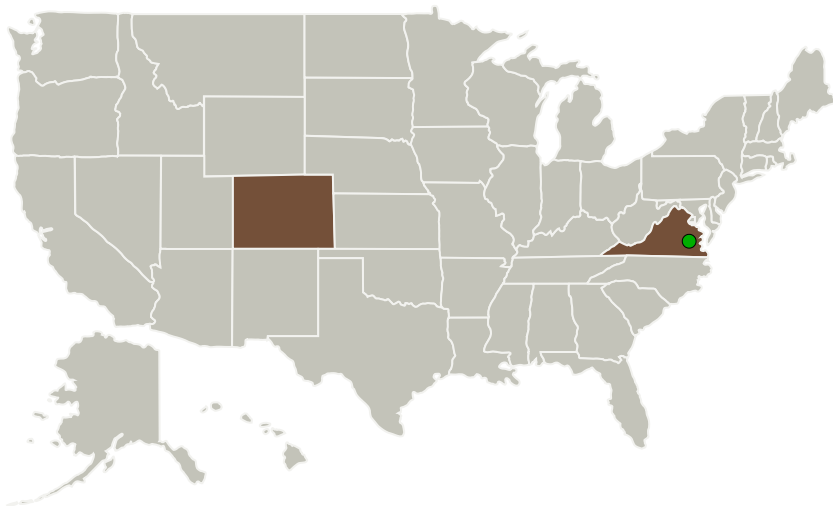
Completed Technology Project (2013 - 2013)



## Project Introduction

Mass and volume efficient solar arrays are sought by NASA, DoD and commercial space to enable high power missions from 20-30 kW up to 300 kW. Flexible substrate arrays can have higher specific power (W/kg) and specific volume (kW/m<sup>3</sup>) than conventional arrays. Typical designs for flexible substrate arrays require a stiff boom mechanism to deploy the array and provide the deployed structure. Graphite composite slit-tube booms are thermally stable and can enable next-generation flexible arrays by improving mass, volume, and cost. CTD has developed and demonstrated a 5cm diameter graphite composite slit-tube boom and canister designed for a 23m tether-stiffened solar array. The Stable Tubular Extendible Lock-Out Composite (STELOC) boom proposed here will feature two innovations to the composite slit-tube design that enhance stiffness. Slit-Lock interlocks the edges of the slit and Root-Lock eliminates the open section at the root of the boom when fully deployed. Combined, these innovations enable a 10cm STELOC boom that is much simpler, lighter, and stiffer than a 25cm diameter coilable longeron boom. This Phase I program will demonstrate a full length, 10cm STELOC boom including all innovative features to enhance stiffness. The program will also develop a conceptual design that meets all boom requirements provided by an identified spacecraft prime contractor for their flexible substrate array.

## Primary U.S. Work Locations and Key Partners



Tubular Extendible Lock-Out Composite Boom (STELOC)

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

## Tubular Extendible Lock-Out Composite Boom (STELOC, Phase I)



Completed Technology Project (2013 - 2013)

Organizations Performing Work	Role	Type	Location
Composite Technology Development, Inc.	Lead Organization	Industry	Lafayette, Colorado
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

## Primary U.S. Work Locations

Colorado	Virginia
----------	----------

## Project Transitions

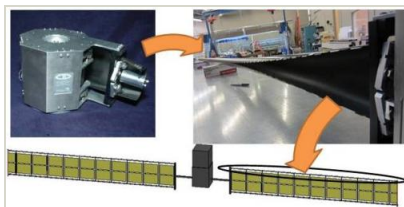
▶ **May 2013:** Project Start

✓ **November 2013:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137635>)

## Images



## Project Image

Tubular Extendible Lock-Out Composite Boom (STELOC)  
(<https://techport.nasa.gov/image/132026>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Composite Technology Development, Inc.

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

Carlos Torrez

## Principal Investigator:

Robert M Taylor

## Co-Investigator:

Robert F Taylor

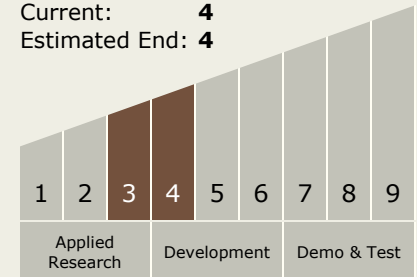
# Tubular Extendible Lock-Out Composite Boom (STELOC, Phase I)

Completed Technology Project (2013 - 2013)



## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



## Technology Areas

### Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - └ TX12.2 Structures
    - └ TX12.2.1 Lightweight Concepts

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System